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Morphological variation and yield performance of photo-insensitive *Dolichos* bean [*Dolichos lablab* (L.) Sweet] genotypes

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Abstract

An experiment was conducted during *Kharif* 2019 at the experimental field of the Dr. PDKV, Akola, to study the morphological variability, yield and yield contributing characteristics among the eight *Dolichos* bean genotypes *viz.*, AK-WAL-18-15, AK-WAL-18-16, AK-WAL-18-25, DOL-VARK-15-01, DOL-VARK-15-02, DOL-VARK-15-03, DOL-VARK-15-04, Phule gauri and one check Kokan bhushan. The experiment was laid out in a RBD with three replications.

The variation for days to 50% flowering ranged from 44.00 days (DOL-VARK-18-02) to 65.66 days (DOL-VARK-18-03). The variation for plant height ranged from 43.67 cm (AK-WAL-18-16) to 71.33 cm (Phule gauri). AK-WAL-18-16 (43.67 cm) was dwarfest one. The variation for number of primary branches/plant had ranged from 3.59 (DOL-VARK-18-03) to 5.52 (Phule gauri). Number of green pods per plant showed variation from 267.06 (AK-WAL-18-15) to 522.23 (AK-WAL-18-16) followed by DOL-VARK-18-01 (520.77). A similar trend was also noticed in green pod yield per plant was registered in AK-WAL-18-16 (5.97 kg) followed by DOL-VARK-18-01 (5.95 kg) and Phule gauri (5.43 kg). Out of eight, four genotypes were significantly superior over the check Kokan bhushan (2.89 kg).

Keywords: *Dolichos lablab*, Dr. PDKV, Akola, Okra, morphological variability

Introduction

Dolichos bean (*Dolichos lablab* L.) also known as Indian bean or Hycianth bean belongs to the family Fabaceae, chromosome number varies with $2n= 20, 22, 24$ (Philip, 1982). It is annual or short-lived perennial vines. The wild species is perennial. It is one of the most ancient among the cultivated plants and is presently grown throughout the tropical region of Asia, Africa and America (Purseglove, 1968 and Kay, 1973) [3, 5]. The wild form lablab was believed to be originated in India and was introduced into Africa from South Asia and now *Dolichos* bean is primarily cultivated in Karnataka and adjoining districts of Tamil Nadu. It is known by various names in different parts of India *viz.*, ol (Bengali), Valpapdi (Gujrat), Val (Hindi), Avare (Kannad), Moang (Kashmiri), Avara (Malayalum), Baragudi (Oriya), Mochai (Tamil) and Wal (Marathi) *etc.*

It is an important food source in tropical Africa and Asia, where it is being grown for its tender green pod and mature fresh green seed. Indian bean is the rich source of protein. 100 g of green pod contain 6.7 g carbohydrates, 3.8 g protein, 1.8 g fibre, 210 mg calcium, 68.0 mg phosphorus and 1.7 mg iron. Pole types are photosensitive. Flowering takes place under short day periods irrespective of planting time. Flowers open generally two days after anther dehiscence. Opening is mostly between 11.00 am to 5.00 pm. It is generally self-pollinated. However, about 6-10% cross-pollination is observed. Pod setting about 20 per spike.

It is an excellent crop to be grown in dry lands with limited rainfall. The crop prefers relatively cool season with sowing done in *July-August*. It starts fruiting in winter and continues to grow indeterminate type in the following spring. Despite having many good attributes, the crop has remained poorly exploited owing to low productivity, long duration, photosensitivity and indeterminate growth habit. Hence, comprehensive germplasm collection and evaluation, identification of suitable genotypes for pure crop cultivation and irrigation of its value as intercrop with other food and forage crop are essential for the improvement in *Dolichos* bean.

Method and materials

Eight genotypes *viz.*, AK-WAL-18-15, AK-WAL-18-16, AK-WAL-18-25, DOL-VARK-18-01, DOL-VARK-18-02, DOL-VARK-18-03, DOL-VARK-18-04, Phule gauri and one check Kokan bhushan were sown in RBD replicated thrice at Chilli and Vegetable Research Unit, Dr. PDKV, Akola during *kharif*-2019.

Seed were sown adopting a spacing 1 m x 1 m. Observation were recorded for days to 50% flowering, days to maturity, plant height, number of primary branches per plant, number of green pod per plant, pod length, pod width, pod weight, number of green seeds per pod, green pod yield per plant, number of picking per genotype, 100 green seed weight and green pod yield per hectare in five randomly selected plants in genotypes in each replication.

Results and discussion

The analysis of variance was calculated for all thirteen characters studied and their mean squares values are presented in Table 1. The mean square due to genotypes was highly significant for all characters, while the mean square due to replication were highly non-significant for all characters. Early to medium maturity duration genotypes are preferred and in the present study among the genotype studied Phule gauri (145.33 days) was found to be earliest followed by AK-WAL1816 (146.67 days) and DOL-VARK-18-04 (147.33 days). Comparable results were reported by Das *et al.* (2015) [2]. Medium to dwarf genotypes are desirable for better crop stand and ultimately for getting good yield. In present study, AK-WAL-18-16 (43.67 cm) was dwarfest one, followed by DOL-VARK-18-04 (49.33 cm) and DOL-VARK-18-01 (53.66 cm). Similar results were recorded by Bagde *et al.* (2002) [1].

The character *viz.*, primary branches per plant, number of green pods per plant, pod weight, number of seeds per pod, green pod yield per plant, 100 green seed weight, and green pod yield per hectare are yield contributing characters and

increase in these characters ultimately result in increased green pod yield. Number of primary branches per plant is an important character in deciding genotype. High number of primary branches per plant ultimately results in high number of pods per plant and high green pod yield. Among the genotypes, Phule gauri (5.52) followed by DOL-VARK-18-01 (5.40) and AK-WAL-18-16 (5.20) recorded higher number of primary branches per plant. The main use of *Dolichos* bean is for edible tender green pods, thus the improvement in number of green pods per plant is the major objective of *Dolichos* bean improvement programme. In the present study, the Kokan bhushan was taken as a standard check, as this has maximum number of green pods per plant. Among the eight genotype, maximum number of green pods per plant recorded by AK-WAL-18-16 (522.23) followed by DOL-VARK-18-01 (520.77) and Phule gauri (514.63). Similar results were recorded by Singh *et al.* (1980) [6]. For pod weight character, among the genotype, maximum pod weight recorded by Phule gauri (64.23 g) followed by AK-WAL-18-16 (62.98 g) and DOL-VARK-18-01 (61.69 g). For number of green seeds per pod, maximum number of green seeds per pod recorded by, DOL-VARK-18-02 (6.28) followed by AK-WAL-18-15 (6.13) and DOL-VARK-18-04 (4.63). Improvement in yield is a prime important in any crop improvement programme. For green pod yield per plant, among the *Dolichos* bean genotype, the highest average green pod yield per plant was recorded by AK-WAL-18-16 (5.97 kg) followed by DOL-VARK-18-01 (5.95 kg) and Phule gauri (5.43 kg). Comparable results were reported by Valu *et al.* (2006) [7] and Nayak *et al.* (2018) [4].

Table 1: Analysis of variance

Sources of variation	d.f.	Days to 50% flowering	Days to maturity	Plant height (cm)	Primary branches/Plant	No. of green pod/plant	Pod length (cm)	Pod width (cm)	Pod weight (g)	No. of green seed/pod	Green pod yield/plant (kg)	No. of picking/genotype	100 green seed weight (g)	Green pod yield/ha(q)
		1	2	3	4	5	6	7	8	9	10	11	12	13
Replications	2	10.12	203.48	0.56	0.01	1759.08	0.57	0.01	2.23	0.06	31.48	0.38	12.95	116.97
Treatments	22	109.89**	97.74**	102.94**	0.73**	40479.78**	3.75**	1.39**	252.72**	2.79**	5165.61**	0.84**	573.58**	25339.84**
Error	44	8.96	15.22	12.92	0.28	4937.25	0.75	0.11	34.63	0.46	540.93	0.67	71.57	2579.21

Note: * Significant at 5% level of significance,

** Significant at 1% level of significance

Table 2: Pod yield and yield attributes of *Dolichos* bean genotypes

Sr. no.	Genotypes	Days to 50% flowering	Days to maturity	Plant height (cm)	Primary branches/plant	No. of green pod/plant	Pod length (cm)	Pod width (cm)	Pod weight (g)	No. of green seed/pod	Green pod yield/plant (kg)	No. of picking/genotype	100 green seed weight (g)	Green pod yield/ha (q)
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	AK-WAL18-15	54.67	154.67	54.67	4.78	267.06	12.75*	1.32	48.33	6.13*	2.59	6.02	79.07	161.61
2	AK-WAL18-16	47.00*	146.67*	43.67**	5.20	522.23*	11.57*	1.15	62.98*	4.09	5.97*	5.27	90.65	372.86*
3	AK-WAL18-25	61.67	157.72	64.00	5.10	291.08	10.35	2.75*	46.38	4.29	3.32	6.08**	97.76*	207.70
4	DOL-VARK-18-01	52.67	162.33	53.66	5.40	520.77*	12.88*	1.40	61.69*	3.73	5.95*	6.23**	99.92**	372.15*
5	DOL-VARK-18-02	44.00**	167.66	58.00	4.23	294.28	10.52	1.35	48.60	6.28**	2.74	3.67	95.24**	171.68
6	DOL-VARK-18-03	65.66	160.66	58.00	3.59	270.29	9.52	2.78**	46.01	4.18	2.79	6.10**	74.20	174.62
7	DOL-VARK-18-04	45.33**	147.33*	49.33*	4.43	282.15	9.29	2.83**	47.00	4.63	2.80	6.08**	82.85	175.44
8	Phule gauri	50.00	145.33	71.33	5.52	514.63*	9.42	1.28	64.23**	3.94	5.43*	5.33	94.53**	339.54*
	Grand mean	52.4	153.8	53.9	5.1	432.5	11.4	2.0	58.7	5.0	4.7	5.7	92.6	295.0
	SE±	1.70	2.40	2.03	0.29	28.89	0.49	0.20	3.32	0.38	0.40	0.46	5.22	25.54
	CD at 5%	4.86	6.85	5.78	0.85	82.23	1.39	0.58	9.47	1.10	1.16	1.32	14.88	72.70
	CV	8.53	8.99	7.56	10.10	11.57	8.45	17.38	9.82	13.39	15.00	14.18	9.78	15.00

Note: * Significant at 5% level of significance,

** Significance at 1% level of significance

Conclusion

Among the genotypes, the genotypes AK-WAL-18-16 (5.97 kg), DOL-VARK-18-01 (5.95 kg) and Phule gauri (5.43 kg) showed better performance especially in respect of green pod yield per plant.

Phule gauri (145.33 days) was found to be earliest and AK-WAL-18-16 maximum number of green pods per plant. Therefore, these genotypes can be taken under consideration for commercial cultivation.

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